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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,395	10/01/2003	Sonia E. Letant	IL-11138	8871
7590 09/24/2007				
John H. Lee Assistant Laboratory Counsel Lawrence Livermore National Laboratory P.O. Box 808, L-703 Livermore, CA 94551		EXAMINER CROW, ROBERT THOMAS		
		ART UNIT PAPER NUMBER		
		1634		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/677,395	LETANT ET AL.	
	Examiner	Art Unit	
	Robert T. Crow	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 13 July 2007 has been entered.

### *Status of the Claims*

2. This action is in response to papers filed 13 July 2007 in which claims 1 and 7 were amended, no claims were canceled, and no new claims were added. All of the amendments have been thoroughly reviewed and entered.

The previous rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) not reiterated below are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are addressed following the rejections.

Claims 1-9 are under prosecution.

### *Interview Summary*

3. The Remarks filed 13 July 2007 are incomplete because no summary of the telephonic interview of 25 July 2006 with John Lee is provided.

4. For the response to this Office Action to be complete, Applicant is **REQUIRED** to include the substance of the interview. Failure to comply with this requirement will be considered **nonresponsive**.

See MPEP § 713.04.

### *Claim Rejections - 35 USC § 112*

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-6 are indefinite in claim 1, which recites "a diameter substantially the same" in line 8 of the claim. The specification does not recite any limiting definition of the metes and bounds of "substantially the same." Thus, it is unclear what amount of difference between the diameter of the cylindrical portion of aperture and the diameter of the macro-cyclic ring is encompassed by the limitation "substantially the same."

*Claim Rejections - 35 USC § 102*

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 7-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Branton et al (PCT International Publication Number WO 00/079257 A1, published 28 December 2000).

Regarding claim 7, Branton et al teach an apparatus. In a single exemplary embodiment, Branton et al teach a substrate in the form of a membrane having one or more apertures formed therein (page 4, lines 22-30). Each aperture has a tapered portion with a top diameter greater than a bottom diameter and wherein in each aperture, the tapered portion transitions into a cylindrical portion having a diameter equal to said bottom diameter of said tapered portion; namely, Figure 3E shows the claimed aperture structure. Branton et al further teach crosslinkers attached to an inner wall of said at least one aperture; namely, chemical crosslinkers are bound to the aperture (page 38, lines 24-30). Branton et al also teach chemical functional groups in the form of polymerases attached to the substrate at or near one end of the

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cylindrical portion of the aperture (page 38, lines 24-30). Polymerases are proteins, which comprise chemical functional groups.

Regarding claim 8, Branton et al teach apparatus of claims 7, wherein the substrate is glass (page 4, lines 19-25).

*Claim Rejections - 35 USC § 103*

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Branton et al (PCT International Publication Number WO 00/079257 A1, published 28 December 2000) in view of Hoyer (J. Polymer Sci. Part A; Poly. Chem., vol. 37, pp.2685-2698 (1999)).

Regarding claims 1 and 3, Branton et al teach an apparatus. In a single exemplary embodiment, Branton et al teach a substrate in the form of a membrane having one or more apertures formed therein (page 4, lines 22-30). Each aperture has a tapered portion with a top diameter greater than a bottom diameter and wherein in each aperture, the tapered portion transitions into a cylindrical portion having a diameter equal to said bottom diameter of said tapered portion; namely, Figure 3E shows the claimed aperture structure. Branton et al further teach crosslinkers attached to an inner wall of said at least one aperture; namely, chemical crosslinkers are bound to the aperture (page 38, lines 24-30).

Branton et al teach catalysts in the form of polymerases attached to the substrate at or near one end of the cylindrical portion of the aperture (page 38, lines 24-30) and apertures having constraining diameters of about 2 nm (page 6, lines 20-30).

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Page 7 of the instant specification also teaches aperture diameters of 2 nm as an embodiment of the instantly claimed diameters. In addition, Figure 8 of the instant specification shows macro-cycle 54, which comprises six phenyl groups connected by six ethynyl groups as an embodiment of the instantly claimed macro-cycle. Thus, a macro-cycle having six phenyl groups connected by six ethynyl groups would have a diameter "substantially the same" as an aperture diameter of 2 nm. Thus, the claim has been given the broadest reasonable interpretation consistent with the teachings of the specification regarding substantially the same diameters as the tapered portion (*In re Hyatt*, 211 F.3d1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (see MPEP 2111 [R-1])).

Branton et al do not teach an attached macro cyclic ring having a diameter substantially the same as the diameter of the cylindrical portion (i.e., claim 1) and having a rigid phenylethynyl backbone (i.e., claim 3). Thus, Branton et al teach a base apparatus that differs from the instantly claimed apparatus because Branton et al do not teach a macro cyclic ring having a rigid phenylethynyl backbone.

However, Hoger teaches macro-cyclic rings (i.e., claim 1) comprising rigid phenylethynyl backbones (i.e., claim 3; Abstract) attached to solid supports (Scheme 4). Hoger also teaches cyclic compound 9 of Scheme 3, which comprises six phenyl groups connected by six ethynyl groups. Hoger also teaches the macro-cycles have the added benefit that they are host molecules that recognize guest molecules by precise complementarity (page 2687, column 2, lines 19-25). Thus, Hoger teaches the known technique of using macro-cyclic rings (i.e., claim 1) comprising rigid phenylethynyl backbones (i.e., claim 3) immobilized on solid surfaces.

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the apparatus as taught by Branton et al with the macro-cyclic ring as taught by Hoger et al with a reasonable expectation of success. The modification would result in the immobilization of a macro-cyclic ring (i.e., claim 1) comprising a rigid phenylethynyl backbone (i.e., claim 3) at the aperture. The diameter of the macro-cycle would be substantially the same as the diameter of the cylindrical portion of the aperture because the diameter of the ring of Hoger is substantially the

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same as the diameter of the ring exemplified by molecule 54 of the instant specification, as well as substantially the same as the diameter of the cylindrical portion of the aperture because the apertures of Branton et al are the same (i.e., about 2 nm) as the aperture diameters on page 7 of the instant specification. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted an apparatus having host molecules therein that recognize guest molecules by precise complementarity as explicitly taught by Hoger et al (page 2687, column 2, lines 19-25). In addition, it would have been obvious to the ordinary artisan that the known technique of using the macro-cycles of Hoger could have been applied to the apparatus of Branton et al with predictable results because the macro-cycles of Hoger are predictably attached to and used on solid surfaces.

Regarding claim 2, the apparatus of claim 1 is discussed above. Branton et al also teach the substrate is glass (page 4, lines 19-25).

Regarding claim 4, the apparatus of claim 1 is discussed above. Hoger et al also teach the attachment of biological or chemical probes to the macro-cyclic ring; namely, guest molecules are bound to said macro-cyclic rings, which as the added advantage of allowing binding of additional guest members so that chemical reactions can be induced between the guests (page 2687, last 10 lines).

Thus, Hoger teaches the known technique of using the attachment of biological or chemical probes to the macro-cyclic ring.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the apparatus as taught by Branton et al in view of Hoger with the attachment of biological or chemical probes to the macro-cyclic ring of Hoger with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in as apparatus having the added advantage of binding of additional guest members so that chemical reactions can be induced between the guests as explicitly taught by Hoger (page 2687, last 10 lines). In addition, it would have been obvious to the ordinary artisan that the known technique of using the attachment of biological or chemical probes to the macro-

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cyclic ring as taught by Hoger could have been applied to the apparatus of Branton et al in view of Hoger with predictable results because the technique predictably result in macro-cycles attached to probe molecules.

Regarding claim 5, the apparatus of claim 4 is discussed above. Branton et al also teach the biological probe comprises a single strand sequence of DNA; namely, nucleic acids are bound to the molecules (i.e., polymerase catalysts) attached to the aperture (page 30, lines 5-15).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Branton et al (PCT International Publication Number WO 00/079257 A1, published 28 December 2000) in view of Hoger (J. Polymer Sci. Part A; Poly. Chem., vol. 37, pp.2685-2698 (1999)) as applied to claim 1 above, and further in view of Go et al (U.S. Patent No 5,04,820, issued 14 April 1992).

Regarding claim 6, the apparatus of claim 1 is discussed above in Section 10.

Branton et al also teach Figure 5A, which shows a substrate comprising dielectric layer 50, silicon wafer 130, a layer of silicon nitride 134, conductive layer 46 (pages 19 and 24), and an additional layer of silicon oxide (i.e., silicon dioxide; page 19, lines 19-25). The dielectric layer is also silicon nitride (page 25). Thus, Branton et al in view of Hoger teach an apparatus that differs from the instantly claimed apparatus in that Branton et al and Hoger do not teach the conductive layer is silicon.

However, Go et al teach silicon has the added advantage of having a relatively high electrical conductivity and heat dissipation (column 3, lines 40-60). Thus, Go et al teach the known technique of using silicon as a conductor.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the apparatus comprising a multilayered substrate as taught by Branton et al in view of Hoger with the silicon conductor of Go et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in an apparatus having the added advantage of having a



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conductor layer having relatively high electrical conductivity and heat dissipation as explicitly taught by Go et al (column 3, lines 40-60). In addition, it would have been obvious to the ordinary artisan that the known technique of using the silicon conductor of Go et al could have been applied to the apparatus of Branton et al in view of Hoger with predictable results because the silicon predictably results in a conductive element.

12. Claims 7 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Branton et al (PCT International Publication Number WO 00/079257 A1, published 28 December 2000) in view of Go et al (U.S. Patent No 5,04,820, issued 14 April 1992).

Regarding claim 9, Branton et al teach the apparatus of claim 7. In a single exemplary embodiment, Branton et al teach a substrate in the form of a membrane having one or more apertures formed therein (page 4, lines 22-30). Each aperture has a tapered portion with a top diameter greater than a bottom diameter and wherein in each aperture, the tapered portion transitions into a cylindrical portion having a diameter equal to said bottom diameter of said tapered portion; namely, Figure 3E shows the claimed aperture structure. Branton et al further teach crosslinkers attached to an inner wall of said at least one aperture; namely, chemical crosslinkers are bound to the aperture (page 38, lines 24-30). Branton et al also teach chemical functional groups in the form of polymerases attached to the substrate at or near one end of the cylindrical portion of the aperture (page 38, lines 24-30). Polymerases are proteins, which comprise chemical functional groups.

Branton et al also teach Figure 5A, which shows a substrate comprising dielectric layer 50, silicon wafer 130, a layer of silicon nitride 134, conductive layer 46 (pages 19 and 24), and an additional layer of silicon oxide (i.e., silicon dioxide; page 19, lines 19-25). The dielectric layer is also silicon nitride (page 25). Thus, Branton et al teach an apparatus that differs from the instantly claimed apparatus in that Branton et al do not teach the conductive layer is silicon.

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However, Go et al teach silicon has the added advantage of having a relatively high electrical conductivity and heat dissipation (column 3, lines 40-60). Thus, Go et al teach the known technique of using silicon as a conductor.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the apparatus comprising a multilayered substrate as taught by Branton et al with the silicon conductor of Go et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in an apparatus having the added advantage of having a conductor layer having relatively high electrical conductivity and heat dissipation as explicitly taught by Go et al (column 3, lines 40-60). In addition, it would have been obvious to the ordinary artisan that the known technique of using the silicon conductor of Go et al could have been applied to the apparatus of Branton et al with predictable results because the silicon predictably results in a conductive element.

#### *Response to Arguments*

13. Applicant's arguments with respect to the previous rejections of the claims have been considered but are moot in view of the new ground(s) of rejection.

#### *Conclusion*

14. No claim is allowed.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Jehanne Sitton/  
Primary Examiner  
9/19/2007

Robert T. Crow  
Examiner  
Art Unit 1634

